

## **Appendix I**

### **Haile Gold Mine EIS**

### **Groundwater Modeling Report and Additional Groundwater Information**

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## List of Acronyms

CCC	criterion continuous concentration
cfs	cubic feet per second
CMC	criterion maximum concentration
DO	dissolved oxygen
EIS	Environmental Impact Statement
ERC	Ecological Resource Consultants, Inc.
Haile	Haile Gold Mine, Inc.
µg/L	micrograms per liter
mg/L	milligrams per liter
m/s	meters per second
NTU	nephelometric turbidity unit
SCDHEC	South Carolina Department of Health and Environmental Control
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

# I. HAILE GOLD MINE EIS GROUNDWATER MODELING REPORT AND ADDITIONAL GROUNDWATER INFORMATION

## I.1 Introduction

This appendix contains data to supplement Sections 3.3 and 4.3 in the Environmental Impact Statement (EIS) for the Haile Gold Mine Project. The appendix includes groundwater quality data, including field parameters, metals, and general chemistry. In addition, the appendix contains the Draft Report Groundwater Modeling Summary, which is also available on the USACE Project website: <http://www.hailegoldmineeis.com>.

## I.2 Groundwater Quality Data

Descriptions of the groundwater quality monitoring wells are provided by Schlumberger (2010). The tables in this section provide summary statistics for the data until April 2012, presented by sampling station. Beginning dates for data collection varies from station to station, ranging from 2008 through 2011. Table I-1 includes site IDs and descriptions for the groundwater sampling stations; these stations are shown in Figure I-1.

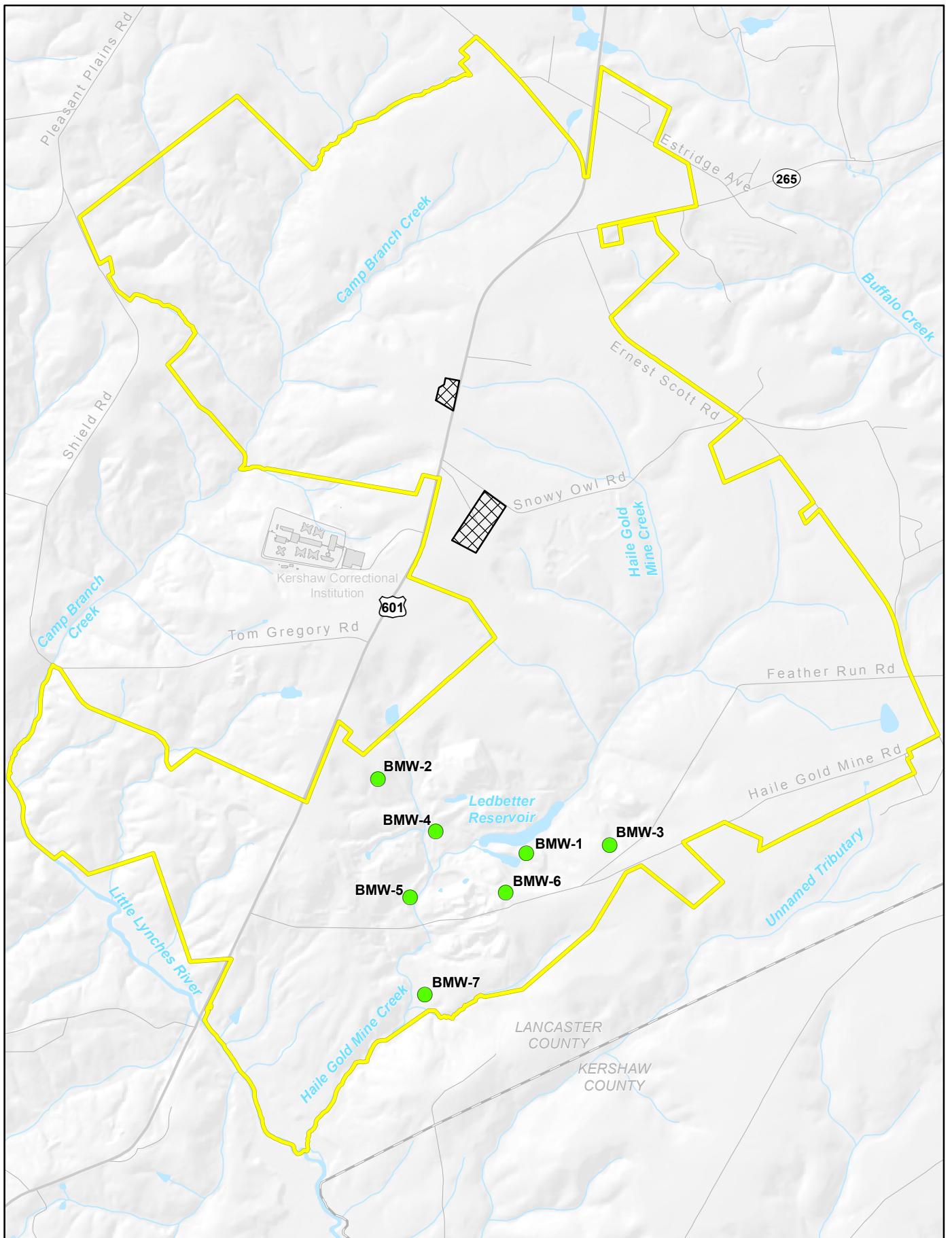
- BMW-01 through BMW-07 are referred to as *historical baseline stations* in this appendix. Samples were taken at these sites beginning in May 2008. Each of these wells samples the bedrock layer, with depths ranging from 144 to 328 feet.
- BMW-09-01 through BMW-09-06 are new monitoring wells that sample the deep bedrock layer and are referred to as *baseline stations*. Sampling at these stations commenced in December 2009. Each of these wells samples from a depth of approximately 800 feet.
- BMW-10-01 through BMW-10-10 are newer wells that are generally located outside the footprint of the other wells. These wells are sampled at depths ranging from 38 to 400 feet, as follows:
  - BMW-10-01 is located in Upper Haile Gold Mine Creek, with a sampling depth of 178 feet.
  - BMW-10-02 is located along the North Fork of Haile Gold Mine Creek, with a sampling depth of 130 feet.
  - BMW-10-03 is located near the ridgeline of the Champion Pit basin, with a sampling depth of 160 feet.
  - BMW-10-04 is adjacent to the proposed Ramona OSA in the Lower Haile Gold Mine Creek basin, at a depth of 400 feet.
  - BMW-10-05 D and S are near the mouth of Haile Gold Mine Creek, at depths of 400 feet and 90 feet, respectively.
  - BMW-10-06 through BMW-10-10 are located around the perimeter of the proposed Duckwood TSF, with depths ranging from 38 to 53 feet.

**Table I-1      Groundwater Sampling Station Descriptions**

Site ID	Sampling Station Description
BMW-01	Adjacent to proposed Ledbetter Pit <sup>a</sup>
BMW-02	Within footprint of proposed 601 OSA <sup>a</sup>
BMW-03	Adjacent to proposed Snake Pit <sup>a</sup>
BMW-05	Along Haile Pit <sup>a</sup>
BMW-06	Along South Pit <sup>a</sup>
BMW-07	Lower Haile Gold Mine Creek drainage basin, between proposed Ramona OSA and Hilltop OSA <sup>a</sup>
BMW-09-01	Adjacent to proposed 601 OSA <sup>b</sup>
BMW-09-02	Adjacent to proposed Hilltop OSA <sup>b</sup>
BMW-09-03	Between Haile Pit and Hilltop OSA <sup>b</sup>
BMW-09-04	Adjacent to proposed Ledbetter Pit <sup>b</sup>
BMW-09-05	Adjacent to proposed Ledbetter Pit and Johnny's PAG <sup>b</sup>
BMW-09-06	Adjacent to proposed Ledbetter Pit <sup>b</sup>
BMW-10-01	Upper Haile Gold Mine Creek drainage basin, along Plant Site Haul Road
BMW-10-02	North Fork of Haile Gold Mine Creek
BMW-10-03	Unnamed tributary near western side of Champion Pit
BMW-10-04	Adjacent to proposed Ramona OSA
BMW-10-05D	Lower Haile Gold Mine Creek drainage basin, near confluence with Little Lynches River
BMW-10-05S	Lower Haile Gold Mine Creek drainage basin, near confluence with Little Lynches River
BMW-10-06	Upper Camp Branch Creek drainage basin, along perimeter of proposed Duckwood TSF
BMW-10-07	Upper Camp Branch Creek drainage basin, along perimeter of proposed Duckwood TSF
BMW-10-08	Upper Camp Branch Creek drainage basin, along perimeter of proposed Duckwood TSF
BMW-10-09	Upper Camp Branch Creek drainage basin, along perimeter of proposed Duckwood TSF
BMW-10-10	Upper Camp Branch Creek drainage basin, along perimeter of proposed Duckwood TSF
DMW-01	Adjacent to proposed Chase Pit <sup>c</sup>
DMW-04	Adjacent to proposed Ledbetter Pit and Johnny's PAG <sup>c</sup>
DMW-07	Within footprint of proposed Johnny's PAG <sup>c</sup>
DMW-08	Adjacent to proposed Ledbetter Pit <sup>c</sup>
DMW-09	Adjacent to proposed Ledbetter Pit <sup>c</sup>
DMW-10	Adjacent to proposed Ledbetter Pit <sup>c</sup>

Note: Refer to Figure I-1 for locations of stations.

- <sup>a</sup> Denotes sites that are most representative of baseline conditions (i.e., not affected by previous mining activities). These sites are referred to as *historical baseline sites* in the following discussions.
- <sup>b</sup> Denotes sites that are most representative of baseline conditions (i.e., not affected by proposed mining activities). These sites are referred to as *baseline sites* in the following discussions.
- <sup>c</sup> Denotes SCDHEC compliance monitoring sites. These sites are referred to as *SCDHEC sites* in the following discussions.



**Figure I-1**  
**Groundwater Quality**  
**Monitoring Stations**  
**in the Study Area**

0 1,000 2,000 Feet  
0 300 600 Meters

Sources: ESRI 2008, Haile 2013,  
Schlumberger Water Service 2010a.



**Legend**

- Project Boundary**
- Not Part of Project**
- Locations of Baseline Monitoring Wells**
- County Boundary**

- Monitoring wells DMW-01 through DMW-10 are SCDHEC compliance monitoring wells.
  - DMW-01 and DMW-02 are in the shallow bedrock layer, with sampling depths of 45 to 88.5 feet, respectively.
  - DMW-03, 05, 06, 08, 09, and 10 are sampled in the saprolite layer, with depths ranging from 28 to 38 feet. DMW-04 and DMW-07 are sampled in the Coastal Plains Sands unit at depths of 30 and 31.5 feet respectively.

The site IDs for these stations are footnoted in the tables to facilitate comparison of the baseline stations to the other stations in the study area. Unless otherwise noted, all sampling stations are located in the Haile Gold Mine Creek within the mining area drainage basin.

## I.2.1 Field Parameters

This section describes the field parameters observed in the study area—primarily from 2008 to 2012, including pH, dissolved oxygen (DO), turbidity, and specific conductance.

### I.2.1.1 pH

Table I-2 shows the range of pH observed at sampling sites. State limits for pH range from 6.0 to 8.5. Monitoring data at historical baseline sites (BMW-01 through BMW-02) are less than State limits typically to the 10th percentile of measured values, but near or within limits from the 50th percentile onward. SCDHEC sites (DMW-01 through DMW-10) are typically less than the State limits through the 95th percentile, reflecting the impact of those lower pH waters on the shallow surface layers within the active Haile Gold Mine. The majority of pH values measured within the Upper Camp Branch Creek drainage basin, where the proposed Duckwood TSF would be located, were less than the State water quality standard of 6.0. At depth, the water becomes more basic, with some sites (BMW-09-02, BMW-10-04, and BMW-10-05D) exceeding the upper bounds of the State limit.

### I.2.1.2 Specific Conductance

Table I-3 summarizes the specific conductance measurements collected in the study area from 2008 to 2012. The baseline site (BMW-09-03) that samples the deep bedrock exhibits the highest specific conductance; with values above 500 at the 75th percentile.

### I.2.1.3 Dissolved Oxygen

The majority of DO concentrations measured in the groundwater are below either the instantaneous standard of 4 mg/L or the daily minimum of 5 mg/L. This is typical of groundwater due to lack of exchange with oxygen in the atmosphere. Values greater than approximately 10 mg/L in the table are likely data entry errors where the DO percent saturation was entered into the database rather than the DO concentration (Table I-4). It is not likely that concentrations of DO in groundwater, which is isolated from atmospheric exchange and photosynthetic organisms, would exceed 10 mg/L. Several sites in the active mining area (BMW-02, BMW-09-04, BMW-10-02, DMW-09) and near the confluence of Haile Gold Mine Creek and the Little Lynches River (BMW-10-05D and BMW-10-05S) exhibited DO levels below 5 mg/L in 95 percent of the samples.

### I.2.1.4 Turbidity

Turbidity data within the study area are sparse (Table I-5). At sites where data were collected, turbidity levels were below the State limit of 50 NTU (SCDHEC 2012). Median turbidity levels are typically less

than 10 NTU. The highest turbidity levels (51 NTU at the 95th percentile) were observed at the deep bedrock station BMW-09-04 (between the proposed Ledbetter Pit and Johnny's PAG).

**Table I-2 pH Levels Observed in Groundwater in the Study Area (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	197	0	<b>5.80</b>	<b>5.86</b>	6.25	6.60	6.73	6.75	6.80
BMW-02	244	0	<b>5.03</b>	<b>5.09</b>	<b>5.64</b>	<b>5.96</b>	6.04	6.11	6.24
BMW-03	136	0	6.07	6.24	6.49	6.76	6.97	7.06	7.09
BMW-05	147	0	<b>5.86</b>	<b>5.95</b>	6.22	6.47	6.68	6.85	7.07
BMW-06	188	0	<b>5.22</b>	<b>5.39</b>	<b>5.66</b>	6.11	6.26	6.32	6.45
BMW-07	128	0	<b>5.19</b>	<b>5.35</b>	<b>5.70</b>	<b>5.99</b>	6.23	6.33	6.48
BMW-09-01	269	0	<b>5.86</b>	<b>5.96</b>	6.57	7.01	7.16	7.44	7.63
BMW-09-02	301	0	7.55	7.87	8.03	8.21	8.39	<b>8.76</b>	<b>8.90</b>
BMW-09-03	226	0	6.66	6.82	7.26	7.48	7.51	7.66	7.71
BMW-09-04	239	0	6.22	6.51	6.66	6.78	6.89	6.97	7.00
BMW-09-05	216	0	6.34	6.53	6.63	6.92	7.09	7.30	7.32
BMW-09-06	243	0	6.44	6.61	6.99	7.20	7.53	7.64	7.71
BMW-10-01	94	0	6.02	6.16	6.35	6.50	6.68	6.76	6.93
BMW-10-02	58	0	6.25	6.31	6.53	6.73	6.83	7.45	7.54
BMW-10-03	96	0	<b>4.87</b>	<b>4.91</b>	<b>5.01</b>	<b>5.21</b>	<b>5.67</b>	6.03	6.17
BMW-10-04	126	0	<b>8.81</b>	<b>8.95</b>	<b>9.31</b>	<b>9.67</b>	<b>10.52</b>	<b>11.91</b>	<b>12.04</b>
BMW-10-05D	129	0	7.99	8.05	8.23	<b>8.51</b>	<b>8.89</b>	<b>9.77</b>	<b>9.90</b>
BMW-10-05S	69	0	6.84	6.89	7.01	7.14	7.44	8.28	8.30
BMW-10-06	53	0	<b>3.96</b>	<b>4.21</b>	<b>4.45</b>	<b>4.59</b>	<b>4.79</b>	<b>4.92</b>	<b>5.05</b>
BMW-10-07	43	0	<b>4.21</b>	<b>4.24</b>	<b>4.45</b>	<b>4.64</b>	<b>4.89</b>	<b>5.02</b>	<b>5.19</b>
BMW-10-08	32	0	<b>5.02</b>	<b>5.24</b>	<b>5.45</b>	<b>5.94</b>	6.17	6.32	6.44
BMW-10-09	43	0	<b>4.47</b>	<b>4.91</b>	6.06	6.34	6.49	6.52	6.55
BMW-10-10	39	0	<b>4.20</b>	<b>4.20</b>	<b>4.52</b>	<b>4.92</b>	<b>5.09</b>	<b>5.44</b>	6.18
DMW-01	33	0	<b>5.00</b>	<b>5.01</b>	<b>5.17</b>	<b>5.60</b>	<b>5.65</b>	<b>5.69</b>	<b>5.69</b>
DMW-04	23	0	<b>3.58</b>	<b>3.63</b>	<b>3.88</b>	<b>4.18</b>	<b>4.26</b>	<b>4.32</b>	<b>4.33</b>
DMW-07	10	0	<b>3.92</b>	<b>3.94</b>	<b>4.03</b>	<b>4.09</b>	<b>4.15</b>	<b>4.28</b>	<b>4.61</b>
DMW-08	15	0	<b>4.54</b>	<b>4.57</b>	<b>4.63</b>	<b>5.03</b>	<b>5.06</b>	<b>5.20</b>	<b>5.30</b>
DMW-09	11	0	<b>4.55</b>	<b>4.80</b>	<b>4.84</b>	<b>5.23</b>	<b>5.38</b>	<b>5.45</b>	6.22
DMW-10	12	0	<b>3.89</b>	<b>3.90</b>	<b>3.93</b>	<b>3.98</b>	<b>4.02</b>	<b>4.10</b>	<b>4.16</b>

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-3 Specific Conductance Levels Observed in Groundwater in the Study Area (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	204	0	54	63	78	81	97	131	212
BMW-02	252	0	40	45	51	55	69	92	146
BMW-03	143	0	35	47	66	72	88	120	194
BMW-05	152	0	66	95	128	168	196	221	358
BMW-06	192	1	46	62	68	72	80	92	110
BMW-07	135	0	53	55	62	78	93	107	115
BMW-09-01	277	0	51	61	108	131	165	176	221
BMW-09-02	307	0	64	105	123	147	157	190	213
BMW-09-03	233	0	161	220	321	387	564	633	700
BMW-09-04	245	0	65	88	114	141	173	210	229
BMW-09-05	223	0	65	67	97	118	145	246	272
BMW-09-06	250	0	60	67	98	123	150	170	176
BMW-10-01	104	0	37	38	64	80	87	103	111
BMW-10-02	67	0	54	54	61	110	115	126	172
BMW-10-03	104	0	29	30	56	58	77	97	107
BMW-10-04	135	0	106	111	208	236	387	403	429
BMW-10-05D	140	0	146	147	296	307	319	454	478
BMW-10-05S	81	0	140	143	253	321	337	420	447
BMW-10-06	65	0	4	10	25	39	43	45	52
BMW-10-07	58	2	12	13	22	25	28	30	34
BMW-10-08	45	0	4	19	29	37	48	61	70
BMW-10-09	55	0	14	17	56	137	147	163	171
BMW-10-10	51	0	7	8	15	16	18	21	82
DMW-01	33	0	87	87	88	183	216	266	278
DMW-04	23	0	13	13	14	20	27	34	35
DMW-07	10	0	6	6	7	13	13	14	18
DMW-08	15	0	41	41	42	66	86	92	93
DMW-09	11	0	167	172	297	325	329	330	392
DMW-10	12	0	22	22	24	36	59	61	61

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-4 Dissolved Oxygen Levels Observed in Groundwater in the Study Area (mg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	189	0	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>1.1</b>	<b>2.5</b>	8.1
BMW-02	236	0	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>0.8</b>	<b>1.4</b>	<b>2.3</b>
BMW-03	128	0	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.8</b>	<b>1.8</b>	<b>3.2</b>	5.2
BMW-05	136	0	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.4</b>	<b>2.6</b>	6.3	8.7
BMW-06	175	0	<b>0.0</b>	<b>0.2</b>	<b>0.3</b>	<b>0.4</b>	<b>0.9</b>	<b>2.8</b>	10.2
BMW-07	120	0	<b>0.1</b>	<b>0.1</b>	<b>0.3</b>	<b>1.8</b>	6.4	39.0	65.6
BMW-09-01	240	0	<b>0.0</b>	<b>0.1</b>	<b>1.0</b>	<b>3.3</b>	13.0	32.4	42.9
BMW-09-02	277	0	<b>0.0</b>	<b>0.1</b>	<b>0.3</b>	<b>0.6</b>	<b>2.9</b>	<b>4.9</b>	12.7
BMW-09-03	201	0	<b>0.0</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>1.7</b>	6.5	10.0
BMW-09-04	197	0	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.5</b>	<b>1.7</b>	<b>2.3</b>
BMW-09-05	199	0	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.5</b>	<b>2.0</b>	<b>4.1</b>	5.8
BMW-09-06	201	0	<b>0.0</b>	<b>0.1</b>	<b>0.2</b>	<b>0.4</b>	<b>1.7</b>	5.8	6.5
BMW-10-01	93	0	<b>2.7</b>	<b>2.8</b>	<b>3.1</b>	9.3	40.4	47.5	48.1
BMW-10-02	50	0	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.6</b>	<b>1.2</b>	<b>4.4</b>	5.0
BMW-10-03	93	0	<b>0.1</b>	<b>0.1</b>	<b>0.4</b>	<b>1.9</b>	5.7	10.4	13.4
BMW-10-04	124	0	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>1.6</b>	9.6	23.3	33.1
BMW-10-05D	126	0	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.4</b>	<b>0.9</b>	<b>4.6</b>
BMW-10-05S	69	0	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>0.5</b>	<b>1.4</b>	<b>2.5</b>	<b>3.2</b>
BMW-10-06	47	0	<b>1.5</b>	<b>2.9</b>	<b>4.4</b>	5.1	13.3	123.3	138.6
BMW-10-07	43	0	<b>3.7</b>	<b>4.9</b>	5.4	6.5	18.3	155.8	164.9
BMW-10-08	30	0	<b>2.4</b>	<b>2.7</b>	<b>3.8</b>	<b>4.9</b>	9.3	23.8	131.7
BMW-10-09	39	0	<b>0.8</b>	<b>0.8</b>	<b>1.9</b>	<b>2.4</b>	6.6	11.6	97.8
BMW-10-10	37	0	<b>1.2</b>	<b>3.2</b>	7.0	7.3	22.5	96.4	220.9
DMW-01	33	0	<b>0.5</b>	<b>0.6</b>	<b>1.2</b>	<b>3.0</b>	<b>4.6</b>	6.9	9.0
DMW-04	23	0	5.5	5.7	6.0	6.5	7.2	7.5	9.0
DMW-07	6	0	<b>4.1</b>	5.7	9.0	9.1	9.4	9.6	9.6
DMW-08	15	0	<b>1.3</b>	<b>1.3</b>	<b>1.7</b>	<b>2.6</b>	<b>3.7</b>	5.8	7.4
DMW-09	11	0	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.4</b>	<b>1.3</b>	<b>1.9</b>	<b>1.9</b>
DMW-10	12	0	<b>3.0</b>	<b>3.3</b>	<b>3.9</b>	<b>4.8</b>	5.6	6.1	6.2

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-5 Turbidity Levels Observed in Groundwater in the Study Area (NTU) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	2	0	8.74	9.17	10.48	12.65	14.83	16.13	16.57
BMW-02	1	0				1.90			
BMW-03	2	0	1.14	1.18	1.30	1.50	1.70	1.82	1.86
BMW-05	1	0				6.20			
BMW-06	1	0				29.00			
BMW-07	3	0	0.42	0.42	0.45	0.48	0.59	0.66	0.68
BMW-09-01	3	0	0.32	0.34	0.41	0.52	0.64	0.70	0.73
BMW-09-02	2	0	0.40	0.42	0.48	0.57	0.67	0.72	0.74
BMW-09-03	3	0	0.98	1.01	1.12	1.30	1.35	1.38	1.39
BMW-09-04	3	0	1.32	1.44	1.80	2.40	3.90	4.80	5.10
BMW-09-05	3	0	0.73	0.74	0.79	0.87	28.94	45.77	<b>51.39</b>
BMW-09-06	3	0	0.24	0.24	0.27	0.30	0.31	0.31	0.31
BMW-10-01	0								
BMW-10-02	1	0				11.00			
BMW-10-03	1	0				0.85			
BMW-10-04	0								
BMW-10-05D	0								
BMW-10-05S	0								
BMW-10-06	0								
BMW-10-07	0								
BMW-10-08	0								
BMW-10-09	0								
BMW-10-10	0								
DMW-01	5	0	0.97	1.00	1.10	23.00	38.00	41.60	42.80
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

## I.2.2 Metals

Elevated trace metal concentrations may adversely affect aquatic life by affecting reproduction, inducing mutations, and causing direct toxicity. As such, the State and the USEPA have established maximum metal concentrations to protect aquatic life and drinking water supplies. These levels typically are adjusted based on the hardness of the ambient waters because hardness affects the bioavailability of the metals. In the absence of hardness data paired with the metals concentrations, a conservative hardness estimate of 25 mg/L as CaCO<sub>3</sub> (calcium) was used as specified by the SCDHEC (2012). The SCDHEC (2012) criteria for metals are expressed in terms of total recoverable metals.

### I.2.2.1 Dissolved Aluminum

Aluminum is a widespread and naturally occurring element in rocks and clay minerals. Aluminum levels in groundwater vary naturally according to the surrounding rock and soil compositions. At several monitoring sites (BMW-01 through BMW-05, BMW-09-03 through BMW-09-04, and BMW-10-01), 100 percent of samples taken were below the minimum reporting limit of 50 µg/L (Table I-6). Elsewhere in the study area, observations of dissolved aluminum concentrations generally exceeded the secondary drinking water quality standards for total aluminum of 50 to 200 µg/L. Shallow groundwater observations near the proposed Duckwood TSF exceeded 1,000 µg/L (BMW-10-07 and BMW-10-10) with the other stations (BMW-10-06, BMW-10-08 through BMW-10-09) exceeding 10,000 µg/L.

### I.2.2.2 Total Antimony

The majority of the monitoring sites yielded no observations of total antimony (Table I-7) above the minimum reporting limit, which ranged from 2.5 to 5 µg/L, and were below the drinking water quality standard (6 µg/L). At site BMW-10-05D, the deep groundwater well below the confluence of Haile Gold Mine Creek and the Little Lyches River, the median value exceeded 6 µg/L.

### I.2.2.3 Total Arsenic

Arsenic is a widely distributed element in the Earth's crust; therefore, it is common for high concentrations of total arsenic to be found in groundwater at depth through the natural dissolution of rocks and minerals. Similar to antimony, the majority of the total arsenic observations were below the minimum reporting limit (2.5 µg/L) and below the drinking water quality standard (10 µg/L). At sites BMW-10-05D and BMW-10-05S, the State drinking water standard was exceeded at the 5th and 25<sup>th</sup> percentile, respectively (Table I-8).

### I.2.2.4 Dissolved Arsenic

All of the dissolved arsenic samples collected at the historical baseline sites were below the minimum reporting limit of 2.5 µg/L (Table I-9), which is well below the water quality standard for the total fraction (10 µg/L), the CCC (150 µg/L), and the CMC (340 µg/L) for dissolved arsenic. Among the sites, there was little variability in dissolved arsenic concentrations, except for sites BMW-10-05D and BMW-10-05S, with the former site exhibiting the CCC standard at the 95th percentile.

**Table I-6 Dissolved Aluminum Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-02	16	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-03	17	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-05	16	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-06	17	76	< 50	< 50	< 50	< 50	< 50	<b>112</b>	<b>298</b>
BMW-07	17	82	< 50	< 50	< 50	< 50	< 50	<b>68</b>	<b>131</b>
BMW-09-01	17	94	< 50	< 50	< 50	< 50	< 50	< 50	<b>68</b>
BMW-09-02	17	94	< 50	< 50	< 50	< 50	< 50	< 50	42
BMW-09-03	17	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-09-04	17	100	21	< 50	< 50	< 50	< 50	< 50	< 50
BMW-09-05	16	88	< 50	< 50	< 50	< 50	< 50	39	<b>54</b>
BMW-09-06	17	94	< 50	< 50	< 50	< 50	< 50	< 50	44
BMW-10-01	11	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-10-02	12	92	< 50	< 50	< 50	< 50	< 50	< 50	<b>63</b>
BMW-10-03	11	9	46	<b>67</b>	<b>75</b>	<b>97</b>	<b>145</b>	<b>210</b>	<b>225</b>
BMW-10-04	11	64	< 50	< 50	< 50	< 50	<b>154</b>	<b>340</b>	<b>3070</b>
BMW-10-05D	14	100	< 50	< 50	< 50	< 50	< 50	< 50	< 50
BMW-10-05S	12	50	< 50	< 50	< 50	48	<b>4600</b>	<b>6310</b>	<b>80020</b>
BMW-10-06	14	14	20	< 50	<b>55</b>	<b>77</b>	<b>543</b>	<b>6354</b>	<b>14055</b>
BMW-10-07	16	31	10	19	< 50	<b>81</b>	<b>223</b>	<b>970</b>	<b>9725</b>
BMW-10-08	15	20	< 50	< 50	<b>1065</b>	<b>3700</b>	<b>15700</b>	<b>48600</b>	<b>77100</b>
BMW-10-09	16	38	< 50	< 50	< 50	<b>745</b>	<b>3475</b>	<b>8300</b>	<b>37500</b>
BMW-10-10	15	47	21	< 50	< 50	< 50	<b>279</b>	<b>1136</b>	<b>3540</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-7 Total Antimony Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-02	3	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-03	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	2	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	2	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-07	6	100	1.6	1.9	< 5	< 5	< 5	< 5	< 5
BMW-09-01	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	8	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	6	83	< 5	< 5	< 5	< 5	< 5	4.1	4.8
BMW-09-06	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-03	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-04	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05D	6	0	5.4	5.4	6.0	<b>7.6</b>	<b>8.6</b>	<b>41.0</b>	<b>57.0</b>
BMW-10-05S	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-06	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-07	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-08	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-09	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-10	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-8 Total Arsenic Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	4	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-02	3	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-03	4	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-05	2	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-06	2	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-07	6	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-01	6	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-02	8	8	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-03	6	6	0	3.6	3.7	3.9	4.5	5.5	5.9
BMW-09-04	7	7	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-05	6	6	50	< 2.5	< 2.5	< 2.5	1.9	2.8	9.4
BMW-09-06	6	7	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-01	5	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-02	5	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-03	4	4	25	1.4	1.6	2.2	2.7	2.8	2.9
BMW-10-04	4	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-05D	6	6	0	<b>30.3</b>	<b>30.5</b>	<b>32.8</b>	<b>38.5</b>	<b>48.0</b>	<b>105.5</b>
BMW-10-05S	4	4	0	8.7	9.4	<b>11.7</b>	<b>14.5</b>	<b>17.3</b>	<b>19.5</b>
BMW-10-06	5	8	75	< 2.5	< 2.5	< 2.5	< 2.5	2.1	6.0
BMW-10-07	5	9	78	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	5.4
BMW-10-08	6	8	38	< 2.5	< 2.5	< 2.5	3.7	<b>10.0</b>	<b>23.3</b>
BMW-10-09	5	8	50	< 2.5	< 2.5	< 2.5	2.2	3.8	9.1
BMW-10-10	5	8	38	< 2.5	< 2.5	< 2.5	9.3	<b>12.0</b>	<b>16.8</b>
DMW-01	0	0							
DMW-04	0	0							
DMW-07	0	0							
DMW-08	0	0							
DMW-09	0	0							
DMW-10	0	0							

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-9 Dissolved Arsenic Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-02	16	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-03	17	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-05	16	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-06	17	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-07	17	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-01	17	82	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	8.3	13.6
BMW-09-02	17	94	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	1.6
BMW-09-03	17	18	< 2.5	< 2.5	3.6	4.7	5.1	5.9	5.9
BMW-09-04	17	94	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	1.5
BMW-09-05	16	25	< 2.5	< 2.5	2.3	3.1	4.1	5.5	6.1
BMW-09-06	17	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-01	11	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-02	12	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-03	11	45	< 2.5	< 2.5	< 2.5	2.7	3.7	4.1	4.3
BMW-10-04	11	82	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	2.7	2.8
BMW-10-05D	14	0	32.0	33.8	42.8	57.0	82.5	138.0	<b>167.5</b>
BMW-10-05S	12	0	7.7	7.9	9.2	11.0	16.8	19.0	59.9
BMW-10-06	14	86	0.9	< 2.5	< 2.5	< 2.5	< 2.5	3.2	8.2
BMW-10-07	16	94	0.3	0.8	< 2.5	< 2.5	< 2.5	< 2.5	7.9
BMW-10-08	15	67	< 2.5	< 2.5	< 2.5	< 2.5	4.9	13.8	22.8
BMW-10-09	16	94	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	3.4
BMW-10-10	15	93	1.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	3.4
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-10 Total Barium Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	0	11.0	11.0	11.0	12.0	12.0	12.6	12.8
BMW-02	5	0	6.8	6.9	7.3	8.4	8.4	8.6	8.7
BMW-03	5	0	8.9	9.0	9.1	10.0	10.0	11.2	11.6
BMW-05	4	25	< 5	< 5	< 5	5.9	7.0	8.5	9.0
BMW-06	6	33	< 5	< 5	< 5	5.2	5.4	14.2	18.6
BMW-07	6	0	24.8	25.5	27.0	28.0	34.3	42.0	45.0
BMW-09-01	6	0	41.3	41.5	42.5	54.0	67.0	78.0	83.0
BMW-09-02	8	0	17.0	17.0	17.0	19.0	22.5	25.2	26.6
BMW-09-03	6	0	17.3	17.5	18.5	23.0	29.0	30.0	30.0
BMW-09-04	7	0	34.1	36.2	39.5	43.0	48.0	58.2	62.1
BMW-09-05	6	0	34.3	34.5	36.5	44.0	47.0	71.0	83.0
BMW-09-06	7	0	18.0	18.0	18.5	20.0	21.5	23.8	24.4
BMW-10-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	6	0	9.6	9.7	9.9	10.0	10.0	11.5	12.3
BMW-10-03	4	25	< 5	< 5	< 5	5.5	5.7	5.8	5.9
BMW-10-04	4	0	36.0	36.0	36.0	36.5	45.3	60.1	65.1
BMW-10-05D	6	0	7.6	7.7	7.8	7.9	8.7	9.1	9.1
BMW-10-05S	4	0	27.2	27.3	27.8	39.5	63.3	85.3	92.7
BMW-10-06	8	0	54.1	55.1	58.3	61.5	73.0	115.0	132.5
BMW-10-07	9	11	10.7	18.9	26.0	28.0	44.0	55.0	67.0
BMW-10-08	8	0	29.9	41.8	57.3	160.0	417.5	881.0	1290.5
BMW-10-09	8	0	47.0	52.9	67.8	86.0	112.5	198.0	289.0
BMW-10-10	8	0	25.1	27.2	35.0	65.0	80.0	114.5	137.3
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

### I.2.2.5 Total Barium

Barium is present as a trace element in metamorphosed igneous and sedimentary rocks present in the study area and therefore can be expected to occur naturally in groundwater. Observed barium concentrations at the deeper baseline sites (BMW-09-01 through BMW-09-06) were slightly elevated compared to the shallower historical baseline sites (BMW-01 through BMW-07) (Table I-10). Total barium concentrations were highest at the proposed Duckwood TSF sites (BMW-10-06 through BMW-10-10). Although most stations sampled were above the minimum reporting limit (5 µg/L), barium concentrations at all sampled stations were below the drinking water quality standard (2,000 µg/L).

### I.2.2.6 Total Beryllium

The majority of the total beryllium samples collected in the study area (Table I-11) were below the minimum reporting limit (0.5 µg/L) and below the drinking water quality standard (4 µg/L). No freshwater aquatic life standards are listed for total beryllium. Two sites at the proposed Duckwood TSF exceeded the drinking water quality standard at the 75th and 95th percentiles, respectively (BMW-10-08 and BMW-10-09).

### I.2.2.7 Total Cadmium

The majority of the total cadmium samples collected were below the minimum reporting limit (0.5 µg/L), the drinking water quality standard (5 µg/L), and the CMC (0.53 µg/L) (Table I-12). However, the minimum reporting limit (0.5 µg/L) is above the CCC (0.1 µg/L) for chronic effects on freshwater organisms. At two sites, BMW-10-03 and BMW-10-08, all observed values exceeded all water quality standards.

### I.2.2.8 Dissolved Cadmium

Observations of dissolved cadmium are presented in Table I-13. The majority of samples collected were below the minimum reporting limit (0.5 µg/L) and the CCC standard (0.097 µg/L) for chronic effects on freshwater organisms. However, the minimum reporting limit is above the CMC limit (0.53 µg/L). Similar to total cadmium observations at site BMW-10-03, all observed dissolved cadmium values exceeded water quality standards. Exceedances of the CCC standard also occurred at several sites at the proposed Duckwood TSF.

### I.2.2.9 Total Chromium (III)

At all stations sampled except BMW-10-09 and BMW-10-10 at the Duckwood TSF, total chromium (III) concentrations were below the minimum reporting limit (10 µg/L), the drinking water quality standard (100 µg/L), the CMC (580 µg/L), and the CCC (28 µg/L) (Table I-14). At station BMW-10-09 at the outlet of the proposed Duckwood TSF, values exceeded the CCC standard at the 75th percentile. Samples for total chromium (III) were collected only in 2011–2012.

**Table I-11 Total Beryllium Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-02	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-03	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-05	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-06	6	83	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	1.0
BMW-07	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-01	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-02	8	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-03	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-04	7	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-05	6	83	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	0.8
BMW-09-06	7	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-01	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-02	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-03	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-04	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05D	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05S	4	75	< 0.5	< 0.5	< 0.5	< 0.5	0.5	1.0	1.1
BMW-10-06	8	75	< 0.5	< 0.5	< 0.5	< 0.5	0.4	1.0	1.3
BMW-10-07	9	78	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	0.7
BMW-10-08	8	13	0.5	0.7	1.0	3.0	<b>5.5</b>	<b>10.1</b>	<b>13.5</b>
BMW-10-09	8	25	< 0.5	< 0.5	0.5	0.8	1.3	3.2	<b>5.0</b>
BMW-10-10	8	63	< 0.5	< 0.5	< 0.5	< 0.5	0.6	0.9	1.1
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

A blank cell corresponds to a "0" number of samples, indicating that no samples were taken at the station. If only one sample was collected, the measured value is placed in the 50th percentile column, and the other columns are blank.

**Table I-12 Total Cadmium Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-02	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-03	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-05	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-06	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-07	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-01	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-02	8	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-03	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-04	7	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-05	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-06	7	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-01	5	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-02	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-03	4	0	<b>5.8</b>	<b>6.0</b>	<b>6.7</b>	<b>7.4</b>	<b>8.1</b>	<b>8.5</b>	<b>8.7</b>
BMW-10-04	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05D	6	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05S	4	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-06	8	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-07	9	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-08	8	0	<b>0.7</b>	<b>0.7</b>	<b>0.8</b>	<b>1.3</b>	<b>2.5</b>	<b>5.5</b>	<b>7.5</b>
BMW-10-09	8	88	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<b>0.4</b>	<b>0.5</b>
BMW-10-10	8	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-13 Dissolved Cadmium Levels Observed in Groundwater in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-02	16	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-03	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-05	16	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-06	17	94	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<b>0.4</b>
BMW-07	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-01	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-02	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-03	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-04	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-05	16	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-09-06	17	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-01	11	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-02	12	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-03	11	0	<b>5.5</b>	<b>5.8</b>	<b>6.2</b>	<b>6.5</b>	<b>9.3</b>	<b>16.0</b>	<b>19.0</b>
BMW-10-04	11	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05D	14	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-05S	12	92	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<b>0.7</b>
BMW-10-06	14	100	<b>0.2</b>	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-07	16	100	0.1	<b>0.2</b>	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BMW-10-08	15	67	< 0.5	< 0.5	< 0.5	< 0.5	<b>0.9</b>	<b>2.5</b>	<b>4.3</b>
BMW-10-09	16	94	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	<b>0.3</b>
BMW-10-10	15	100	<b>0.2</b>	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-14 Total Chromium (III) Levels Observed in Surface Waters in the Study Area (µg/L) (2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-02	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-03	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-05	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-06	5	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-07	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-01	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-02	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-03	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-04	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-05	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-06	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-01	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-02	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-03	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-04	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-05D	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-05S	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-06	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-07	5	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-08	3	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-09	3	33	6	7	9	13	<b>67</b>	<b>99</b>	<b>109</b>
BMW-10-10	3	67	< 10	< 10	< 10	< 10	10	12	13
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

### I.2.2.10 Hexavalent Chromium

Hexavalent chromium (chromium IV) concentrations also were monitored only in 2011-2012 and data is sparse. At the stations sampled, approximately half showed concentrations below the minimum reporting limit (<10 µg/L for the majority of the samples), the drinking water quality standard (100 µg/L), the CMC (16 µg/L), and the CCC (11 µg/L) (Table I-15). At some stations (BMW-01, BMW-05, BMW-09-04, BMW-09-05, and BMW-10-08), the reporting limits were higher than the water quality standards (100 µg/L) during January and April 2012. At stations BMW-01 and BMW-10-03, samples taken during January and April 2012 had reporting limits of 1000 µg/L.

### I.2.2.11 Total Chromium

At majority of the monitoring sites, total chromium concentrations were below the minimum reporting limit (5 µg/L) and/or below the drinking water quality standard (100 µg/L) (Table I-16). No freshwater aquatic life standards are listed for total chromium. Several samples at sites BMW-10-08 and BMW-10-09 at the Duckwood TSF exceeded State limits. One sample at BMW-10-09 collected in November 2010 exceeded 600 µg/L.

### I.2.2.12 Total Copper

The majority of total copper samples were below the minimum reporting limit (5 µg/L) at the historic baseline and deep bedrock baseline sites in the study area (Table I-17). However, the minimum reporting limit is greater than the drinking water standard (1.3 µg/L). For samples above the minimum reporting limit, such as those at stations BMW-10-03 (all observations), BMW-10-04, and BMW-10-05S, the observed concentrations were in excess of the CCC (2.9 µg/L) and the CMC (3.8 µg/L). For nearly all observations at the Duckwood TSF greater than the minimum reporting limit, the concentration of total copper were above the CMC limit at the 25th percentile.

### I.2.2.13 Dissolved Copper

Like total copper, the majority of dissolved copper samples at the historic baseline and deep bedrock baseline sites were below the minimum reporting limit (5 µg/L), with the exception of two samples at BMW-06 and a single sample at sites BMW-09-02 and BMW-09-05 that exceed the CCC (2.7 µg/L) and the CMC (3.6 µg/L) (Table I-18). Again, the minimum detection limit is greater than the drinking water standard for the total fraction (1.3 µg/L). The highest dissolved copper concentrations were found at site BMW-10-03 near the proposed Champion Pit and at all sites at the Duckwood TSF.

### I.2.2.14 Fluoride

Total fluoride concentrations were below the minimum reporting limit (1000 µg/L) and the drinking water quality standard (4000 µg/L) for all samples at all sites (Table I-19).

### I.2.2.15 Total Iron

Iron is another widespread and naturally varying element in rocks and clay minerals. Total iron concentrations exceeded the drinking water quality standard (300 µg/L) at nearly all stations (Table I-20), often greatly exceeding standards even at the 5th percentile. There are no State freshwater aquatic life standards for iron.

**Table I-15 Total Chromium (VI) Levels Observed in Groundwater in the Study Area (µg/L) (2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	2	50	<b>40</b>	<b>64</b>	<b>137</b>	<b>258</b>	<b>379</b>	<b>452</b>	<b>476</b>
BMW-02	1	0				< 10			
BMW-03	2	100	< 10	< 10	<b>16</b>	<b>28</b>	<b>39</b>	<b>46</b>	<b>48</b>
BMW-05	2	100	<b>50</b>						
BMW-06	5	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-07	3	67	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-01	1	100				< 10			
BMW-09-02	2	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-09-03	1	100				< 10			
BMW-09-04	2	100	< 10	< 10	<b>16</b>	<b>28</b>	<b>39</b>	<b>46</b>	<b>48</b>
BMW-09-05	3	100	< 10	< 10	< 10	< 10	<b>28</b>	<b>41</b>	<b>46</b>
BMW-09-06	0								
BMW-10-01	1	0				< 10			
BMW-10-02	2	0	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-03	2	50	<b>35</b>	<b>59</b>	<b>133</b>	<b>255</b>	<b>378</b>	<b>451</b>	<b>476</b>
BMW-10-04	2	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-05D	1	100				< 10			
BMW-10-05S	1	100				< 10			
BMW-10-06	2	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-07	4	100	< 10	< 10	< 10	< 10	< 10	< 10	< 10
BMW-10-08	2	0	<b>102</b>	<b>104</b>	<b>110</b>	<b>120</b>	<b>130</b>	<b>136</b>	<b>138</b>
BMW-10-09	1	0				< 10			
BMW-10-10	2	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-16 Total Chromium Levels Observed in Surface Waters in the Study Area (µg/L) (2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-02	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-03	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	6	67	< 5	< 5	< 5	< 5	5	7	8
BMW-07	6	83	< 5	< 5	< 5	< 5	< 5	4	5
BMW-09-01	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	8	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-06	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-03	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-04	4	75	< 5	< 5	< 5	< 5	3	5	5
BMW-10-05D	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05S	4	50	< 5	< 5	< 5	5	10	14	16
BMW-10-06	8	38	< 5	< 5	< 5	6	12	27	35
BMW-10-07	9	67	< 5	< 5	< 5	< 5	5	12	14
BMW-10-08	8	38	< 5	< 5	< 5	23	84	<b>166</b>	<b>243</b>
BMW-10-09	8	0	6	6	11	91	<b>175</b>	<b>373</b>	<b>587</b>
BMW-10-10	8	38	< 5	< 5	< 5	15	18	31	43
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-17 Total Copper Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-02	5	80	< 5	< 5	< 5	< 5	< 5	<b>7.6</b>	<b>9.3</b>
BMW-03	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-07	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-01	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	8	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-06	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-03	4	0	<b>8.4</b>	<b>8.5</b>	<b>8.6</b>	<b>9.8</b>	<b>11.3</b>	<b>11.7</b>	<b>11.9</b>
BMW-10-04	4	75	< 5	< 5	< 5	< 5	<b>3.5</b>	<b>5.4</b>	<b>6.0</b>
BMW-10-05D	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05S	4	50	< 5	< 5	< 5	<b>4.1</b>	<b>7.8</b>	<b>11.5</b>	<b>12.8</b>
BMW-10-06	8	25	< 5	< 5	<b>5.1</b>	<b>9.2</b>	<b>14.8</b>	<b>33.5</b>	<b>42.3</b>
BMW-10-07	9	11	<b>3.7</b>	<b>4.8</b>	<b>5.8</b>	<b>6.4</b>	<b>10.0</b>	<b>15.2</b>	<b>19.6</b>
BMW-10-08	8	0	<b>18.7</b>	<b>19.4</b>	<b>27.5</b>	<b>70.0</b>	<b>135.0</b>	<b>237.0</b>	<b>338.5</b>
BMW-10-09	8	0	<b>13.8</b>	<b>16.6</b>	<b>23.5</b>	<b>69.0</b>	<b>122.5</b>	<b>277.0</b>	<b>448.5</b>
BMW-10-10	8	25	< 5	< 5	<b>7.8</b>	<b>24.0</b>	<b>31.0</b>	<b>44.5</b>	<b>60.3</b>
DMW-01	5	100	< 5	< 5	< 5	<b>5.0</b>	<b>5.0</b>	<b>5.0</b>	<b>5.0</b>
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-18 Dissolved Copper Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-02	16	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-03	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	16	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	17	88	< 5	< 5	< 5	< 5	< 5	<b>8.7</b>	<b>28.6</b>
BMW-07	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-01	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	17	94	< 5	< 5	< 5	< 5	< 5	< 5	<b>7.6</b>
BMW-09-03	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	16	94	< 5	< 5	< 5	< 5	< 5	< 5	<b>3.1</b>
BMW-09-06	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	11	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	12	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-03	11	45	< 5	< 5	< 5	<b>5.2</b>	<b>8.8</b>	<b>12.0</b>	<b>12.0</b>
BMW-10-04	11	91	< 5	< 5	< 5	< 5	< 5	< 5	<b>4</b>
BMW-10-05D	14	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05S	12	83	< 5	< 5	< 5	< 5	< 5	<b>6.8</b>	<b>130.0</b>
BMW-10-06	14	79	< 5	< 5	< 5	< 5	< 5	<b>18.3</b>	<b>54.1</b>
BMW-10-07	16	69	< 5	< 5	< 5	< 5	<b>5</b>	<b>6.5</b>	<b>17.7</b>
BMW-10-08	15	13	< 5	<b>4.2</b>	<b>7.8</b>	<b>13.0</b>	<b>48.0</b>	<b>145.6</b>	<b>240.0</b>
BMW-10-09	16	75	< 5	< 5	< 5	< 5	<b>3.3</b>	<b>19.0</b>	<b>99.0</b>
BMW-10-10	15	87	< 5	< 5	< 5	< 5	< 5	<b>10.0</b>	<b>18.0</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-19 Fluoride Levels Observed in Surface Waters in the Study Area  
( $\mu\text{g/L}$ ) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-02	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-03	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-05	16	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-06	18	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-07	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-01	18	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-02	18	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-03	18	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-04	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-05	16	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-09-06	17	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-01	11	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-02	12	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-03	11	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-04	11	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-05D	14	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-05S	12	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-06	14	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-07	16	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-08	15	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-09	16	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
BMW-10-10	15	100	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-20 Total Iron Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	0	<b>6500</b>	<b>6500</b>	<b>6500</b>	<b>6800</b>	<b>7000</b>	<b>7000</b>	<b>7000</b>
BMW-02	5	0	<b>1016</b>	<b>1062</b>	<b>1200</b>	<b>1500</b>	<b>1600</b>	<b>1600</b>	<b>1600</b>
BMW-03	5	0	<b>1620</b>	<b>1640</b>	<b>1700</b>	<b>2000</b>	<b>2300</b>	<b>2360</b>	<b>2380</b>
BMW-05	4	0	<b>818</b>	<b>836</b>	<b>890</b>	<b>960</b>	<b>1050</b>	<b>1140</b>	<b>1170</b>
BMW-06	6	17	<b>613</b>	<b>1175</b>	<b>2425</b>	<b>3000</b>	<b>3575</b>	<b>12850</b>	<b>17425</b>
BMW-07	6	33	< 100	< 100	128	<b>455</b>	<b>655</b>	<b>825</b>	<b>893</b>
BMW-09-01	6	33	< 100	< 100	65	115	143	<b>390</b>	<b>510</b>
BMW-09-02	8	100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
BMW-09-03	6	17	78	105	163	175	188	230	250
BMW-09-04	7	0	<b>1032</b>	<b>1104</b>	<b>1200</b>	<b>1200</b>	<b>1550</b>	<b>1940</b>	<b>1970</b>
BMW-09-05	6	0	265	280	<b>313</b>	<b>335</b>	<b>403</b>	<b>2510</b>	<b>3555</b>
BMW-09-06	7	0	146	152	170	200	<b>740</b>	<b>950</b>	<b>1025</b>
BMW-10-01	5	100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
BMW-10-02	6	0	<b>4000</b>	<b>4000</b>	<b>4000</b>	<b>4200</b>	<b>4475</b>	<b>5100</b>	<b>5400</b>
BMW-10-03	4	0	<b>3335</b>	<b>3470</b>	<b>3875</b>	<b>4150</b>	<b>4200</b>	<b>4200</b>	<b>4200</b>
BMW-10-04	4	50	< 100	< 100	< 100	155	<b>1220</b>	<b>2948</b>	<b>3524</b>
BMW-10-05D	6	83	< 100	< 100	< 100	< 100	< 100	85	103
BMW-10-05S	4	0	<b>506</b>	<b>681</b>	<b>1208</b>	<b>7750</b>	<b>14750</b>	<b>16100</b>	<b>16550</b>
BMW-10-06	8	0	248	265	<b>438</b>	<b>4650</b>	<b>9625</b>	<b>23500</b>	<b>28750</b>
BMW-10-07	9	22	< 100	< 100	140	<b>450</b>	<b>1300</b>	<b>3940</b>	<b>4620</b>
BMW-10-08	8	0	<b>3170</b>	<b>3940</b>	<b>5200</b>	<b>16000</b>	<b>52750</b>	<b>103000</b>	<b>141500</b>
BMW-10-09	8	0	<b>13400</b>	<b>14800</b>	<b>21250</b>	<b>61000</b>	<b>100250</b>	<b>182000</b>	<b>266000</b>
BMW-10-10	8	0	267	274	<b>325</b>	<b>15000</b>	<b>18000</b>	<b>26700</b>	<b>36850</b>
DMW-01	4	0	<b>7195</b>	<b>7690</b>	<b>9175</b>	<b>13000</b>	<b>17750</b>	<b>20900</b>	<b>21950</b>
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

### **I.2.2.16 Total Lead**

The majority of the total lead concentrations throughout the study area exceeded secondary standards ( $300 \mu\text{g/L}$ ), with less variation in the historical baseline sites (Table I-21). The greatest total iron concentrations were found in the shallow groundwater wells at the Duckwood TSF.

### **I.2.2.17 Dissolved Lead**

Unlike total lead concentrations, majority of the dissolved lead concentrations were below the minimum reporting limit ( $1.5 \mu\text{g/L}$ ), the CCC standard ( $0.54 \mu\text{g/L}$ ), and the CMC standard ( $14 \mu\text{g/L}$ ) (Table I-22). The exceptions were for stations located under Duckwood TSF (BMW-10-006 through BMW-10-10) and near the confluence of Haile Gold Mine Creek and Little Lynches River (BMW-10-05D and BMW-10-05S).

### **I.2.2.18 Total Manganese**

Along with aluminum and lead, manganese is one of the most abundant metals on the Earth's surface. At nearly all locations in the study area including the historic baseline and deep bedrock baseline sites, total manganese concentrations were well above the drinking water quality standard of  $50 \mu\text{g/l}$  (Table I-23). The highest concentrations were observed at Duckwood TSF (BMW-10-08 and BMW-10-09). There are no State freshwater aquatic life standards for manganese. Only a few samples fell below the minimum reporting limit ( $5 \mu\text{g/L}$ ).

### **I.2.2.19 Total Mercury**

Total mercury concentrations for the majority of samples were below the minimum reporting limit ( $0.2 \mu\text{g/L}$ ) (Table I-24). All samples were below the drinking water quality standard ( $2 \mu\text{g/L}$ ), the CMC ( $1.6 \mu\text{g/L}$ ), and the CCC ( $0.91 \mu\text{g/L}$ ).

### **I.2.2.20 Dissolved Mercury**

Dissolved mercury concentrations for all samples were below the minimum reporting limit ( $0.2 \mu\text{g/L}$ ), the drinking water standard for total mercury ( $2 \mu\text{g/L}$ ), the CMC ( $1.4 \mu\text{g/L}$ ), and the CCC ( $0.77 \mu\text{g/L}$ ) (Table I-25).

### **I.2.2.21 Total Nickel**

Total nickel concentrations were frequently below the minimum reporting limit, which ranged from 1 to  $5 \mu\text{g/L}$  (Table I-26). Four of the stations sampled, one historic baseline site (BMW-06), one shallow groundwater station (BMW-10-05S), and two stations at Duckwood TSF (BMW-10-08 and BMW-10-09) exceeded the CCC of  $16 \mu\text{g/L}$  in 10 to 15 percent of samples. The two samples at Duckwood TSF also exceeded the CMC standard ( $145 \mu\text{g/L}$ ). There are no drinking water standards for this parameter.

### **I.2.2.22 Dissolved Nickel**

Trends in dissolved nickel concentrations follow those of the total nickel concentrations (Table I-27): samples were frequently below the minimum reporting limit and the stations that exceeded the CCC standard ( $16 \mu\text{g/L}$ ) exceeded the dissolved nickel standard as well. None of the samples exceeded the CMC standard ( $145 \mu\text{g/L}$ ).

**Table I-21 Total Lead Levels Observed in Surface Waters in the Study Area (µg/L)  
(2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-02	5	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-03	5	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-05	4	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-06	6	83	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>2.3</b>	<b>3.0</b>
BMW-07	6	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-01	6	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-02	8	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-03	6	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-04	7	86	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.4</b>	<b>1.9</b>
BMW-09-05	6	83	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>5.9</b>	<b>8.4</b>
BMW-09-06	7	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-01	5	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-02	6	83	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.7</b>	<b>2.1</b>
BMW-10-03	4	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-04	4	75	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.4</b>	<b>2.5</b>
BMW-10-05D	6	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-05S	4	50	< 1.5	< 1.5	< 1.5	<b>2.7</b>	<b>5.8</b>	<b>7.8</b>	<b>8.4</b>
BMW-10-06	8	38	< 1.5	< 1.5	< 1.5	<b>3.7</b>	<b>7.6</b>	<b>18.5</b>	<b>23.8</b>
BMW-10-07	9	44	< 1.5	< 1.5	< 1.5	<b>3.0</b>	<b>3.8</b>	<b>8.8</b>	<b>10.9</b>
BMW-10-08	8	0	<b>3.2</b>	<b>4.3</b>	<b>7.8</b>	<b>25.0</b>	<b>60.5</b>	<b>109.7</b>	<b>154.9</b>
BMW-10-09	8	0	<b>1.7</b>	<b>1.7</b>	<b>2.9</b>	<b>4.0</b>	<b>5.9</b>	<b>12.4</b>	<b>19.2</b>
BMW-10-10	8	13	<b>1.0</b>	<b>1.3</b>	<b>2.0</b>	<b>8.2</b>	<b>10.3</b>	<b>16.1</b>	<b>22.1</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-22 Dissolved Lead Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-02	16	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-03	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-05	16	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-06	17	94	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.10</b>
BMW-07	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-01	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-02	17	88	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.41</b>	<b>2.44</b>
BMW-09-03	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-04	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-09-05	16	94	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.21</b>
BMW-09-06	17	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-01	11	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-02	12	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-03	11	100	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
BMW-10-04	11	82	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.80</b>	<b>5.85</b>
BMW-10-05D	14	93	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>1.08</b>
BMW-10-05S	12	67	< 1.5	< 1.5	< 1.5	< 1.5	<b>3.48</b>	<b>8.32</b>	<b>94.67</b>
BMW-10-06	14	86	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>8.63</b>	<b>24.25</b>
BMW-10-07	16	94	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>10.31</b>
BMW-10-08	15	20	< 1.5	< 1.5	<b>2.45</b>	<b>6.20</b>	<b>27.50</b>	<b>71.60</b>	<b>109.60</b>
BMW-10-09	16	81	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>2.05</b>	<b>5.48</b>
BMW-10-10	15	80	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	<b>3.64</b>	<b>6.06</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-23 Total Manganese Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	0	<b>522</b>	<b>524</b>	<b>530</b>	<b>550</b>	<b>560</b>	<b>566</b>	<b>568</b>
BMW-02	5	0	<b>160</b>	<b>170</b>	<b>200</b>	<b>220</b>	<b>220</b>	<b>232</b>	<b>236</b>
BMW-03	5	0	<b>390</b>	<b>390</b>	<b>390</b>	<b>410</b>	<b>420</b>	<b>510</b>	<b>540</b>
BMW-05	4	0	<b>364</b>	<b>377</b>	<b>418</b>	<b>440</b>	<b>465</b>	<b>510</b>	<b>525</b>
BMW-06	6	17	25	48	<b>93</b>	<b>95</b>	<b>121</b>	<b>205</b>	<b>243</b>
BMW-07	6	0	15	17	24	<b>56</b>	<b>102</b>	<b>150</b>	<b>170</b>
BMW-09-01	6	0	<b>153</b>	<b>155</b>	<b>163</b>	<b>175</b>	<b>180</b>	<b>185</b>	<b>188</b>
BMW-09-02	8	0	<b>81</b>	<b>91</b>	<b>100</b>	<b>155</b>	<b>170</b>	<b>173</b>	<b>177</b>
BMW-09-03	6	0	<b>275</b>	<b>280</b>	<b>298</b>	<b>330</b>	<b>393</b>	<b>450</b>	<b>470</b>
BMW-09-04	7	0	<b>492</b>	<b>504</b>	<b>545</b>	<b>570</b>	<b>665</b>	<b>760</b>	<b>805</b>
BMW-09-05	6	0	<b>398</b>	<b>415</b>	<b>470</b>	<b>545</b>	<b>575</b>	<b>685</b>	<b>738</b>
BMW-09-06	7	0	<b>193</b>	<b>196</b>	<b>200</b>	<b>220</b>	<b>290</b>	<b>330</b>	<b>345</b>
BMW-10-01	5	80	< 5	< 5	< 5	< 5	< 5	22	29
BMW-10-02	6	0	<b>955</b>	<b>970</b>	<b>1000</b>	<b>1000</b>	<b>1000</b>	<b>1050</b>	<b>1075</b>
BMW-10-03	4	0	<b>142</b>	<b>143</b>	<b>148</b>	<b>150</b>	<b>155</b>	<b>164</b>	<b>167</b>
BMW-10-04	4	0	<b>101</b>	<b>111</b>	<b>143</b>	<b>170</b>	<b>233</b>	<b>327</b>	<b>359</b>
BMW-10-05D	6	67	< 5	< 5	< 5	< 5	7	24	31
BMW-10-05S	4	0	<b>202</b>	<b>233</b>	<b>328</b>	<b>570</b>	<b>785</b>	<b>830</b>	<b>845</b>
BMW-10-06	8	0	35	38	42	<b>54</b>	<b>83</b>	<b>132</b>	<b>146</b>
BMW-10-07	9	11	10	17	25	29	43	<b>56</b>	<b>83</b>
BMW-10-08	8	0	<b>171</b>	<b>192</b>	<b>225</b>	<b>570</b>	<b>1450</b>	<b>2920</b>	<b>4110</b>
BMW-10-09	8	0	<b>812</b>	<b>913</b>	<b>1150</b>	<b>1550</b>	<b>2550</b>	<b>4980</b>	<b>7290</b>
BMW-10-10	8	0	20	23	30	<b>78</b>	<b>110</b>	<b>170</b>	<b>240</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-24 Total Mercury Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-02	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-03	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-05	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-06	6	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-07	6	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-01	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-02	6	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-03	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-04	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-05	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-06	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-01	5	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-02	6	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-03	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-04	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-05D	6	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-05S	4	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-06	8	88	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.13	0.17
BMW-10-07	10	70	< 0.2	< 0.2	< 0.2	< 0.2	0.21	0.30	0.44
BMW-10-08	8	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-09	9	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-10	9	78	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.37	0.38
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-25 Dissolved Mercury Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	15	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-02	15	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-03	16	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-05	16	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-06	17	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-07	17	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-01	14	93	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.14
BMW-09-02	17	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-03	14	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-04	17	94	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.14
BMW-09-05	16	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-09-06	17	94	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.14
BMW-10-01	10	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-02	12	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-03	11	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-04	10	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-05D	13	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-05S	11	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-06	13	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-07	16	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-08	15	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-09	16	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
BMW-10-10	15	93	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.24
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-26 Total Nickel Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	80	< 5	< 5	< 5	< 5	< 5	4.06	4.58
BMW-02	5	80	< 5	< 5	< 5	< 5	< 5	5.44	6.42
BMW-03	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	6	17	5.38	8.25	14.00	14.50	<b>17.25</b>	<b>19.00</b>	<b>19.50</b>
BMW-07	6	83	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-01	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	8	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	6	83	< 5	< 5	< 5	< 5	< 5	4.15	4.98
BMW-09-06	7	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	5	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-03	4	0	5.22	5.23	5.28	6.30	8.23	9.89	10.45
BMW-10-04	4	75	< 5	< 5	< 5	< 5	3.65	5.72	6.41
BMW-10-05D	6	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05S	4	50	< 5	< 5	< 5	6.10	12.03	<b>16.21</b>	<b>17.61</b>
BMW-10-06	8	63	< 5	< 5	< 5	< 5	5.53	7.76	8.88
BMW-10-07	9	89	< 5	< 5	< 5	< 5	< 5	3.16	4.48
BMW-10-08	8	0	7.46	8.02	9.63	<b>22.00</b>	<b>46.75</b>	<b>96.70</b>	<b>138.35</b>
BMW-10-09	8	0	8.44	9.28	13.75	<b>51.50</b>	<b>91.75</b>	<b>211.00</b>	<b>340.50</b>
BMW-10-10	8	88	< 5	< 5	< 5	< 5	< 5	5.05	8.03
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-27 Dissolved Nickel Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	59	< 5	< 5	< 5	< 5	3.5	3.9	4.3
BMW-02	16	63	1.5	1.5	1.7	< 5	< 5	< 5	< 5
BMW-03	17	100	< 1	< 1	< 1	< 5	< 5	< 5	< 5
BMW-05	16	100	< 1	< 1	< 1	< 5	< 5	< 5	< 5
BMW-06	17	6	4.6	5.2	6.9	7.4	14.0	<b>18.8</b>	<b>20.6</b>
BMW-07	17	94	< 1	< 1	< 1	< 5	< 5	< 5	< 5
BMW-09-01	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-04	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	16	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-06	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	11	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	12	92	< 5	< 5	< 5	< 5	< 5	< 5	4.0
BMW-10-03	11	0	5.3	5.4	6.3	6.7	9.0	9.3	10.7
BMW-10-04	11	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05D	14	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-05S	12	67	< 5	< 5	< 5	< 5	7.0	14.3	<b>116.3</b>
BMW-10-06	14	86	1.8	< 5	< 5	< 5	< 5	4.8	9.4
BMW-10-07	16	94	< 1	1.5	< 5	< 5	< 5	< 5	4.4
BMW-10-08	15	33	< 5	< 5	< 5	6.9	<b>25.5</b>	<b>65.0</b>	<b>106.1</b>
BMW-10-09	16	75	< 5	< 5	< 5	< 5	3.8	11.6	<b>63.0</b>
BMW-10-10	15	100	1.9	< 5	< 5	< 5	< 5	< 5	< 5
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

### I.2.2.23 Total Selenium

Total selenium concentrations for all samples were below the minimum reporting limit (2.5 µg/L) and the CCC standard (5 µg/L) except for two stations at Duckwood TSF (BMW-10-08 and BMW-10-10) (Table I-28). A single sample at BMW-10-10 also exceeded the drinking water quality standard (50 µg/L).

### I.2.2.24 Total Silver

Total silver concentrations at all sampling stations were below the minimum reporting limit (1 µg/L) and the drinking water standard (100 µg/L) (Table I-29). However, the minimum reporting limit is above the CMC (0.37 µg/L) and the CCC (0.31 µg/L) standards.

### I.2.2.25 Total Thallium

All samples of total thallium concentrations were below the minimum reporting limit (1 µg/L) and the drinking water quality standard (2 µg/L) with the exception of one sample taken at BMW-10-08 at the proposed Duckwood TSF (Table I-30). There are no freshwater aquatic life standards for this parameter.

### I.2.2.26 Total Zinc

**I.2.2.27 Approximately half of the total zinc samples collected in the study area were less than the minimum reporting limit of 20 µg/L (Table I-31). One historic baseline site (BMW-06) had several samples exceeding the CCC and CMC standards (both are 37 µg/L). All samples at sites BMW-10-03 and BMW-10-08 exceeded both standards, but were all below the secondary standard (5000 µg/L). Dissolved Zinc**

Dissolved zinc concentrations at 18 stations showed concentrations at the 95<sup>th</sup> percentiles that were greater than the CMC and CCC standards for exposure of freshwater aquatic organisms (the standard for both is 36 µg/l) (Table I-32). No samples exceeded the drinking water standard specified for total zinc (5000 µg/l); however, this 95th percentile value is based on a single sample that may have an elevated concentration due to a reporting error in the database. The total zinc concentration report for that station and date (7/7/2009) was less than the minimum reporting limit of 20 µg/L. Many additional samples collected in the study area were less than the minimum reporting limit for zinc. At sites BMW-10-03 and BMW-10-08, all samples exceeded both the CCC and CMC standards.

## I.2.3 General Chemistry

### I.2.3.1 Cyanide

Cyanide historically has been used in the Project area to heap-extract gold from piles of ore. Concentrations at all of the sampling locations were below the minimum reporting limit (0.01 mg/L); and all were well below the drinking water quality standard (0.2 mg/L), the CMC (22,000 mg/l), and the CCC (5,200 mg/l) (Table I-33).

**Table I-28 Total Selenium Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-02	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-03	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-05	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-06	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-07	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-01	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-02	8	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-03	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-04	7	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-05	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-09-06	7	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-01	5	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-02	6	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-03	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-04	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-05D	6	83	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	2.3	2.8
BMW-10-05S	4	100	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
BMW-10-06	8	75	< 2.5	< 2.5	< 2.5	< 2.5	1.6	2.7	2.8
BMW-10-07	9	78	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	3.2	3.3
BMW-10-08	8	75	< 2.5	< 2.5	< 2.5	< 2.5	1.9	<b>26.9</b>	<b>53.9</b>
BMW-10-09	8	75	< 2.5	< 2.5	< 2.5	< 2.5	1.7	2.9	3.0
BMW-10-10	8	50	< 2.5	< 2.5	< 2.5	2.1	<b>6.8</b>	<b>9.7</b>	<b>10.3</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-29 Total Silver Levels Observed in Surface Waters in the Study Area  
( $\mu\text{g/L}$ ) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-02	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-03	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-05	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-06	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-07	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-01	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-02	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-03	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-04	7	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-05	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-06	7	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-01	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-02	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-03	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-04	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-05D	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-05S	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-06	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-07	9	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-08	8	100	< 1	< 1	< 1	< 1	< 1	<b>1.0</b>	<b>1.5</b>
BMW-10-09	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-10	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-30 Total Thallium Levels Observed in Surface Waters in the Study Area  
( $\mu\text{g/L}$ ) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-02	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-03	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-05	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-06	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-07	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-01	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-02	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-03	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-04	7	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-05	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-09-06	7	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-01	5	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-02	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-03	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-04	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-05D	6	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-05S	4	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-06	8	88	< 1	< 1	< 1	< 1	< 1	0.7	0.9
BMW-10-07	9	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BMW-10-08	8	75	< 1	< 1	< 1	< 1	0.6	1.9	<b>2.9</b>
BMW-10-09	8	88	< 1	< 1	< 1	< 1	< 1	0.8	1.2
BMW-10-10	8	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-31 Total Zinc Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	5	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-02	5	80	< 20	< 20	< 20	< 20	< 20	21.4	25.2
BMW-03	5	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-05	4	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-06	6	17	19.5	29.0	<b>48.8</b>	<b>53.5</b>	<b>68.0</b>	<b>96.0</b>	<b>108.0</b>
BMW-07	6	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-09-01	6	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-09-02	8	88	< 20	< 20	< 20	< 20	< 20	27.7	<b>48.4</b>
BMW-09-03	6	83	< 20	< 20	< 20	< 20	< 20	22.0	28.0
BMW-09-04	7	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-09-05	6	83	< 20	< 20	< 20	< 20	< 20	34.0	<b>46.0</b>
BMW-09-06	7	86	< 20	< 20	< 20	< 20	< 20	28.0	<b>41.5</b>
BMW-10-01	5	80	< 20	< 20	< 20	< 20	< 20	24.4	29.2
BMW-10-02	6	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-10-03	4	0	<b>79.3</b>	<b>79.6</b>	<b>80.5</b>	<b>84.5</b>	<b>91.0</b>	<b>96.4</b>	<b>98.2</b>
BMW-10-04	4	50	< 20	< 20	< 20	19.0	35.5	<b>49.0</b>	<b>53.5</b>
BMW-10-05D	6	83	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-10-05S	4	50	< 20	< 20	< 20	18.5	27.3	27.7	27.9
BMW-10-06	8	38	< 20	< 20	< 20	30.0	<b>39.0</b>	<b>46.5</b>	<b>51.8</b>
BMW-10-07	9	56	< 20	< 20	< 20	< 20	30.0	31.8	35.4
BMW-10-08	8	0	<b>130.5</b>	<b>141.0</b>	<b>172.5</b>	<b>340.0</b>	<b>632.5</b>	<b>1411.0</b>	<b>2205.5</b>
BMW-10-09	8	13	20.5	31.0	<b>45.3</b>	<b>107.0</b>	<b>187.5</b>	<b>399.0</b>	<b>619.5</b>
BMW-10-10	8	25	< 20	< 20	17.5	25.5	34.0	<b>54.4</b>	<b>60.7</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-32 Dissolved Zinc Levels Observed in Surface Waters in the Study Area (µg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	71	< 20	< 20	< 20	< 20	20.0	21.8	24.4
BMW-02	16	94	< 20	< 20	< 20	< 20	< 20	< 20	16.5
BMW-03	17	82	< 20	< 20	< 20	< 20	< 20	34.6	<b>59.6</b>
BMW-05	16	88	< 20	< 20	< 20	< 20	< 20	17.5	<b>39.5</b>
BMW-06	17	6	29.2	34.6	<b>39.0</b>	<b>50.0</b>	<b>66.0</b>	<b>82.4</b>	<b>101.6</b>
BMW-07	17	82	< 20	< 20	< 20	< 20	< 20	<b>57.8</b>	<b>73.6</b>
BMW-09-01	17	100	< 20	< 20	< 20	< 20	< 20	< 20	< 20
BMW-09-02	17	71	< 20	< 20	< 20	< 20	22.0	<b>131.2</b>	<b>198.0</b>
BMW-09-03	17	76	< 20	< 20	< 20	< 20	< 20	33.2	<b>38.2</b>
BMW-09-04	17	76	< 20	< 20	< 20	< 20	< 20	<b>84.2</b>	<b>112.0</b>
BMW-09-05	16	94	< 20	< 20	< 20	< 20	< 20	< 20	<b>45.0</b>
BMW-09-06	17	94	< 20	< 20	< 20	< 20	< 20	< 20	14.2
BMW-10-01	11	91	< 20	< 20	< 20	< 20	< 20	< 20	<b>40.0</b>
BMW-10-02	12	92	< 20	< 20	< 20	< 20	< 20	< 20	15.0
BMW-10-03	11	0	<b>81.0</b>	<b>86.0</b>	<b>90.5</b>	<b>100.0</b>	<b>110.0</b>	<b>120.0</b>	<b>135.0</b>
BMW-10-04	11	82	< 20	< 20	< 20	< 20	< 20	35.0	<b>40.0</b>
BMW-10-05D	14	86	< 20	< 20	< 20	< 20	< 20	31.7	<b>53.6</b>
BMW-10-05S	12	67	< 20	< 20	< 20	< 20	22.3	29.6	<b>336.0</b>
BMW-10-06	14	57	7.2	< 20	< 20	< 20	<b>54.8</b>	<b>100.7</b>	<b>134.5</b>
BMW-10-07	16	75	2.0	6.0	< 20	< 20	15.5	<b>91.5</b>	<b>297.5</b>
BMW-10-08	15	0	<b>50.2</b>	<b>52.4</b>	<b>62.5</b>	<b>94.0</b>	<b>300.0</b>	<b>794.0</b>	<b>1413.0</b>
BMW-10-09	16	75	< 20	< 20	< 20	< 20	14.0	<b>56.0</b>	<b>177.0</b>
BMW-10-10	15	73	7.6	< 20	< 20	< 20	16.0	28.8	<b>36.6</b>
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-33 Total Cyanide Levels Observed in Surface Waters in the Study Area (mg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-02	17	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-03	17	94	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.01
BMW-05	16	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-06	18	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-07	17	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-01	17	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-02	16	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-03	16	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-04	18	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-05	16	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-09-06	18	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-01	11	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-02	12	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-03	11	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-04	11	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-05D	14	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-05S	12	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-06	14	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-07	16	94	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.01
BMW-10-08	15	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-09	15	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BMW-10-10	15	100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

### **I.2.3.2 Total Suspended Solids**

The amount of suspended solids with a diameter greater than 0.45 micrometers ( $\mu\text{m}$ ) is quantified by the total suspended solids (TSS) measurement (Table I-34). There are no numeric standards for TSS and TSS was only measured at the historic and deep bedrock baseline sites. TSS observations were less than the reporting limit (5 mg/L) at many stations.

### **I.2.3.3 Total Dissolved Solids**

The amount of minerals and salts dissolved in water is quantified by the measurement of total dissolved solids (TDS) measurement (Table I-35). There is no apparent pattern in the spatial distribution of median and upper percentile concentrations. However, exceedances of the drinking water quality standard (500 mg/L) were observed at the 90th percentile at the Duckwood TSF station BMW-10-08.

### **I.2.3.4 Sulfate**

All samples collected in the study area were below the drinking water quality standard (250 mg/L) (Table I-36). At several stations, measurements were typically below the minimum reporting limit (5 mg/L).

**Table I-34 Total Suspended Solids Levels Observed in Surface Waters in the Study Area (mg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	4	50	< 5	< 5	< 5	6.0	10.6	12.7	13.3
BMW-02	3	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-03	3	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-05	2	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-06	5	20	4.4	6.3	12.0	13.0	15.0	258.0	339.0
BMW-07	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-01	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-02	3	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-03	3	67	< 5	< 5	< 5	< 5	4.3	5.3	5.7
BMW-09-04	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-05	3	67	< 5	< 5	< 5	< 5	141.3	224.5	252.3
BMW-09-06	4	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-01	0								
BMW-10-02	0								
BMW-10-03	0								
BMW-10-04	0								
BMW-10-05D	0								
BMW-10-05S	0								
BMW-10-06	0								
BMW-10-07	0								
BMW-10-08	0								
BMW-10-09	0								
BMW-10-10	0								
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-35 Total Dissolved Solids Levels Observed in Surface Waters in the Study Area (mg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	0	44	49	56	60	78	82	89
BMW-02	16	0	24	32	42	46	59	79	85
BMW-03	17	0	78	81	84	98	110	124	152
BMW-05	16	0	105	125	130	145	153	160	165
BMW-06	18	6	25	29	45	54	60	71	79
BMW-07	17	0	42	54	68	80	94	114	124
BMW-09-01	17	0	60	75	98	110	130	138	152
BMW-09-02	16	0	73	87	99	110	135	160	170
BMW-09-03	16	0	220	240	280	315	380	430	463
BMW-09-04	18	0	99	107	113	130	140	196	210
BMW-09-05	16	0	57	70	84	88	120	130	148
BMW-09-06	18	0	67	74	93	105	118	133	146
BMW-10-01	11	0	39	46	67	98	130	140	140
BMW-10-02	12	0	68	68	76	105	120	129	130
BMW-10-03	11	0	23	28	35	48	68	110	115
BMW-10-04	11	0	155	160	160	180	210	220	235
BMW-10-05D	13	0	64	106	170	180	180	206	226
BMW-10-05S	12	0	136	143	178	195	223	239	240
BMW-10-06	13	8	12	18	28	46	50	54	59
BMW-10-07	14	14	< 5	7	13	31	48	57	69
BMW-10-08	15	0	57	59	111	230	425	<b>800</b>	<b>1064</b>
BMW-10-09	15	0	60	64	96	120	150	360	483
BMW-10-10	14	14	< 5	7	15	23	28	47	59
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

**Table I-36 Sulfate Levels Observed in Surface Waters in the Study Area (mg/L) (2008–2012)**

Site ID	n	pct ND (%)	Percentile						
			5	10	25	50	75	90	95
BMW-01	17	6	6.8	8.4	9.0	10.0	10.0	10.0	10.2
BMW-02	17	0	11.8	12.0	13.0	13.0	14.0	16.4	22.8
BMW-03	17	88	< 5	< 5	< 5	< 5	< 5	3.7	6.5
BMW-05	16	0	15.8	16.0	17.8	20.0	25.3	27.5	28.5
BMW-06	18	11	< 5	3.1	16.0	17.5	19.0	19.0	19.0
BMW-07	17	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-09-01	18	0	9.3	9.3	9.7	10.0	11.0	33.6	87.9
BMW-09-02	18	0	9.7	10.0	11.3	12.0	14.8	17.2	20.3
BMW-09-03	18	6	8.9	47.1	78.3	88.5	99.8	143.0	151.5
BMW-09-04	17	0	14.8	17.4	19.0	31.0	43.0	51.8	62.6
BMW-09-05	16	0	9.1	10.4	11.8	19.0	23.3	25.5	28.8
BMW-09-06	17	0	6.2	8.0	15.0	20.0	23.0	26.6	29.2
BMW-10-01	11	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-02	12	0	10.0	10.0	10.0	10.5	11.0	11.0	11.0
BMW-10-03	11	0	17.0	17.0	17.5	20.0	22.0	24.0	24.5
BMW-10-04	11	0	31.5	32.0	34.5	37.0	39.5	46.0	193.0
BMW-10-05D	14	0	11.7	12.0	12.3	13.0	14.0	15.7	16.7
BMW-10-05S	12	8	4.1	5.4	8.9	12.0	20.5	28.6	42.1
BMW-10-06	14	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-07	16	100	< 5	< 5	< 5	< 5	< 5	< 5	< 5
BMW-10-08	15	60	< 5	< 5	< 5	< 5	6.3	7.0	10.7
BMW-10-09	16	88	< 5	< 5	< 5	< 5	< 5	3.8	108.8
BMW-10-10	15	93	< 5	< 5	< 5	< 5	< 5	< 5	4.2
DMW-01	0								
DMW-04	0								
DMW-07	0								
DMW-08	0								
DMW-09	0								
DMW-10	0								

Notes:

n = number of samples

pct ND = percent non-detect

Numbers in bold-faced, italicized font indicate that the value is outside of the range of water quality standards.

BMW-01 through BMW-07 are the historical baseline sites. BMW-09-01 through BMW-09-06 are the baseline sites. DMW-01 through DMW-10 are SCDHEC compliance monitoring sites.

### I.3 Literature Cited

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